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Novel Word Learning by Spanish-speaking Preschoolers

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Novel Word Learning by Spanish-speaking Preschoolers

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Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

December, 2006

Novel Word Learning by Spanish-speaking Preschoolers

Publication No._____

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The University of Texas at Austin, 2006

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Cues are present in communication interactions which help children to learn that new words may refer to whole objects, object parts, actions, characteristics, or the relationships between other words. This study explored the extent to which Spanish-speaking 3-year-old children used object bias and morphosyntactic bootstrapping as cues to constrain the meaning of new words presented with a novel action and object scene. Upon hearing a word for the first time children may assume that it refers to a whole object, or children may rely on morphosyntactic information such as definite articles and direct object clitics to indicate that new words are either nouns or verbs. The results of this study indicated that by 3 years of age Spanish-speaking children do not assume that novel words refer to whole objects; rather action responses were more prevalent.

Additionally, while children did not use definite articles and direct object clitics as morphosyntactic cues to interpret the referents of new words as actions or objects, the accuracy with which they mapped new words to targeted scenes did vary with the grammatical morphemes presented.

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INTRODUCTION

When children are exposed to a new word they might assume that the word is a referent for any object, attribute, event or relationship from their environment or experiences. To narrow the possible referent of a new word children can rely on biases or strategies developed from exposure to cues in their social or linguistic environment. Various investigators have explored the possibility that differences in child socialization practices and language specific morphological and syntactic features affect the processes involved in word learning (Bedore & Leonard, 2000; Gathercole & Min, 1997; Imai, Haryu, & Okada,, 2005; Peña & Kester, 2004; Pérez-Pereira, 1991; Tardif, Shatz, & Naigles, 1997). The current study explores how object bias (a predisposition for learning the names of objects) and morpho syntactic bootstrapping (the use of morphosyntax as a cue to word meaning) influence the way that 3 year-old Spanish-speaking children interpret novel words. Spanish provides a particularly interesting context for examining how children use these strategies because child socialization practices and Spanish language features may emphasize object names less than in English-speaking communities, and Spanish is a morphologically complex language (relative to other languages such as English) which may heighten Spanish-speaking children's ability to use morphosyntactic cues to determine the meaning of novel words.

Object Bias in Word Learning

Gentner (1982; Gentner & Boroditsky, 2001) suggested that objects and the words that name them have a privileged status over other entities in early learning processes because, concrete objects (e.g., ball) are easier to individuate, identify and conceptualize than the appropriate features of an action-sequence (e.g., throw) or the parts or

characteristics of an object (e.g., red). Maratsos (1990) similarly suggested that in all languages, nouns are easily grouped together into a grammatical category class due to the concrete features of objects. This concreteness is not present for other notions, such as actions or relationships; therefore learners must use different strategies for understanding and grouping non-noun words into classes.

Numerous researchers have produced experimental evidence suggesting that objects and the words which name them are learned more easily and earlier than words naming object parts, attributes, actions or other concepts. For example, infant's attention to objects appears to be heightened in the presence of linguistic information (Echols, 1991), and while learning new words in reference to objects, children assume that the word is the name of the whole object rather than its parts, attributes or actions (Golinkoff, Mervis & Hirsh-Pasek, 1994; Macnamara, 1972, 1982; Markman, 1989, 1991, 1992; Markman & Wachtel, 1988). In addition, children more effectively employ word learning strategies to learn new object words than new action words (Merriman, Marazita, & Jarvis, 1995), and children demonstrate increased speed and success in learning new nouns and their related morphemes when compared to new adjectives or verbs and their related morphemes (Imai, Haryu, & Okada, 2005; Rice & Woodsmall, 1988; Tomasello, 1997).

Some observational evidence also indicates an object bias in word learning. Nelson (1973) demonstrated that nouns increased at a greater rate than other word types in the productive vocabularies of 18 English-speaking children between 1 and 2 years of age. Gentner (1982) analyzed retrospective reports, journals, and sample transcriptions to examine children speaking English, Kaluli, Mandarin, Japanese, German, and Turkish finding that children predominantly used nouns. In a study comparing monolingual English-speaking and monolingual Italian-speaking children from 8 months to 16 months

of age, parents used a checklist method to report that word types which appeared first for children in each language group were those used in social routines, such as “hi” and “uh oh,” followed by object labels or nouns (Caselli et al., 1995).

Additional evidence for word learning assessed through checklist, diary and sampling procedures provides conflicting evidence about the status of objects and in early language development, as object bias in word learning is not equally evident in all languages and cultures (Camaioni & Longobardi, 1999; Choi & Gopnik, 1995; Tardif et al., 1997). For example, Choi (1999; Choi & Gopnik, 1995) examined language samples from Korean-speaking toddlers and found that a verb spurt as well as - and often before - a noun spurt was present in the children’s vocabularies which is not characteristic of children learning languages such as English. Tardif (1996) argued that verbs were more prevalent or equal to nouns in the vocabularies of Mandarin-speaking children, depending on how action and object words were defined. Over-all, nouns were not more prevalent then verbs. A follow-up study compared the word types used by 1-year-old children learning Mandarin, English or Italian. Children learning Mandarin produced more verbs relative to their English and Italian-speaking peers, while noun productivity was higher for the English- and Italian-speaking children (Tardif et al., 1997).

While observations of many children’s vocabulary inventories and their abilities to learn new words suggest that objects and noun are privileged in learning, this bias has not been observed universally for all language and cultural groups and in all learning tasks. A bias for learning the names of objects could be influenced by linguistic features and child socialization practices. One community in which object bias may not be as prevalent is in Spanish-speaking Latino cultures. Linguistic features such as rich morphology and cultural characteristics such as an emphasis on child behavior may deemphasize an object bias in word learning.

Linguistic Influences on Object Bias

Differences across languages in morphosyntax can make object words or action words more salient and thus more easily learned. Features such as word order in a sentence, the ability to produce grammatical phrases without nouns and pronouns, and the amount of functional information contained in verbal inflections may influence the relative importance and learnability of nouns and verbs across languages.

Slobin (1985) suggested that linguistic information occurring in initial and final positions is easiest to hear. Since English grammar employs a subject-verb-object (SVO) sequence for sentence construction, the subject and object words, which are nouns, occupy the most salient sentence positions. Other languages, however, employ word order rules that allow verbs to occupy the initial or final positions in a sentence. Caselli et al. (1995) suggested that flexible word order in Italian compared to English causes verbs to be more salient in Italian than English. In fact, verbs appear in salient utterance initial positions significantly more often than nouns in Italian child-directed speech (Camaioni & Longobardi, 1999). Choi and Gopnik (1995) suggested that the early verb spurt observed in Korean-speaking children was due in part to the structure of the Korean language which allows final positioning of verbs. Like Italian and Korean verbs, Spanish verbs can appear in salient initial and final sentence positions due to flexible word order rules.

Another feature which influences the presence and positioning of nouns across languages is the null subject rule. Languages allowing null subjects have nonobligatory expression of subject nouns and pronouns when information can be recovered from other elements in the communication context (Jaeggli & Safir, 1989). In Spanish subject nouns

are often dropped and the information is recovered from verbal inflections (Zagona, 2002). Subject deletion may reduce the frequency of nouns produced in null subject languages.

Finally, Spanish verbs are richly inflected, in comparison to other languages such as English. The Spanish verb *hablar* (to speak) receives word final inflections which indicate subject information like number and person as in *hablo* ([I] speak) and *hablan* ([they] speak). In contrast, English makes these same distinctions with obligatory pronouns, but no verb inflection as in *I speak* and *they speak*. The rich system of morphology in Spanish allowing verbs to carry information about subject nouns along with salient initial and final sentence positioning of verbs and the null subject feature contribute to the salience and importance of verbs in languages such as Spanish.

Social and Cultural Influences on Object Bias

While many linguistic characteristics contribute to a child's ability to learn new words, social and cultural factors also contribute (Blount & Padgug, 1977; Gopnik & Choi, 1990; Heath, 1983; Yoder & Kaiser, 1987). Adult teaching and interaction styles may explain differential language skill and use in young children (Pine, 1994). For example, English-speaking mothers often play the "naming game", naming objects and eliciting object names from their children (Goldfield, 1993; Masur, 1997; Nelson, Hampson, & Shaw, 1993). However, Peña and Quinn (1997) found evidence that description tasks (e.g., What are stoves used for?) were more familiar to Spanish-speaking preschoolers than picture labeling tasks. Also, the language characteristics of Hispanic mothers appear to favor compliance and behavior more than the language of European American mothers. For example, Slobin (1982) reported that Spanish-speaking adults were concerned with making sure that their 2-year-old children were not

malcriados (rude), and Spanish-speaking mothers have been described as regulatory, using more directive teaching styles and more verbal attentional devices and commands than European American mothers (Bornstein et al., 1992; Harwood, Schoelmerich, Schulze, & Gonzalez, 1999; Slobin, 1982). Pine (1994) found that English-speaking mothers' use of statement utterances correlated with their children's later use of nouns while regulatory utterances correlate with children's use of verbs. If children learning Spanish hear a high number of regulatory utterances they may not experience the same emphasis on nouns as children from other cultural and linguistic groups who hear more statement utterances.

Morphosyntactic Influences on Word Learning

The evidence for children's use of morphosyntactic cues as bootstraps for learning word suggests that syntax becomes an important cue for word learning by the preschool years. For example, two-year-olds are sensitive to the contexts in which words and morphemes co-occur (Gerken & McIntosh, 1993), and by three years of age children are sensitive to English canonical word order (Thal & Flores, 2001). The majority of this evidence comes from English learners (Fisher, 2002; Gleitman & Gleitman, 1992; Golinkoff, Diznoff, Yasik, & Hirsh-Pasek, 1992; Hoff & Naigles, 2002; Tomasello, 2000, 2003).

A rich morphological system may provide an advantage for early morphosyntactic bootstrapping in Spanish. For example, Spanish-speaking 2-3 year-olds appeared to be sensitive to morphological cues to learn new nouns as countable (e.g., *un queso, a cheese*) or massed (e.g., *queso, cheese*) (Colunga & Gasser, 2001). And, Waxman, Senghas, and Benveniste (1997) found that Spanish-speaking 3 and 4-year-olds

demonstrated sensitivity to determiner and adjective constructions such as *una roja* (a red [one]) indicating adjective word class.

Still, sensitivity to morphological cues is not fully developed in the early preschool years, as Waxman and colleagues (1997) further found that 6 and 7-year-old Spanish-speaking children demonstrated even greater sensitivity to adjective related morphology, indicating an increase in sensitivity with age. And, in sentence interpretation tasks, Kail (1989; Kail & Charvillat, 1988) found that Spanish-speaking children demonstrated a sensitivity to word order cues to identify the subject and object of a sentence as early as 2 years of age. However, sensitivity to the morpheme *a* to indicate humans as objects as in *él besó **a** la niña* (he kissed [ ] the girl), was not observed until 6 years of age. Finally, English- and Spanish-speaking 3 year-olds performed similarly on a task in which variations in morphology affected the fast mapping of novel verbs (Bedore and Leonard, 2000). Thus, while there is some evidence that Spanish-speaking preschoolers take advantage of morphological cues in word learning, this advantage is not seen for all morphemes, it is not completely developed in the preschool years, and a heightened sensitivity to morphological cues compared to other languages is not always present. One explanation for these differences in results is that morphemes support word learning in different ways at different points in the acquisition process. Before a word can be learned it must be segmented from the speech in which it occurs (Hoff & Naigles, 2002). Initially, morphemes may support the segmentation of new words, and as children have greater experience with a word and morpheme combinations across contexts they may use morphemes as cues for learning specific word meanings.

Many previous studies of novel word learning have examined how preschoolers take advantage of morphosyntax to learn words within a single form class. Bedore and Leonard (2000) observed novel verb learning; Colunga and Gasser (2001) observed novel

noun learning; and Waxman and colleagues (1997) observed novel adjective learning. However, they did not examine how children might take advantage of morphosyntactic cues to differentiate word classes; such as a noun versus a verb interpretation of a novel word.

Relatively few studies have observed how children take advantage of morphosyntactic cues for interpreting novel words when their possible referent can be either a noun or a verb. Golinkoff, Church Jacquet, & Hirsh-Pasek (1992) found that 2 to 3-year-old English-speaking children used morphological cues alone as well as morphological cues combined with syntactic cues to differentially interpret the meaning of pictured novel words as either actions or objects. When morphology cues were presented without syntactic cues, children responded above chance levels in tasks with morphology supporting a noun interpretation though they were near chance levels when the morphology supported a verb interpretation. In an act-out task, Eyer and colleagues (2002) taught English-speaking children aged 33-43 months novel words under 2 different morphosyntactic conditions: when morphology supported either a noun or verb interpretation or when syntax and morphology together supported either a noun or verb interpretation. Children's responses did not differ from chance in the condition where only morphology cues were available. However, children were above chance in their noun interpretations when both syntactic and morphological cues were compatible with a noun interpretation. Under the conditions that supported verb interpretations, neither morphology alone nor syntax and morphology cues combined were sufficient to cue the children to interpret words as verbs, and their responses were at chance levels. While these studies differed in task types (i.e., picture pointing or acting out), these two studies suggest that 3-year-old English-speaking children take advantage of morphosyntactic cues in the learning of novel nouns. However, English-speaking preschoolers' use of

morphosyntactic cues for learning novel verbs is less clear. Imai et al. (2005) examined how Japanese-speaking 3 and 5-year-old children interpreted novel words presented in either noun or verb supporting morphosyntactic frames while viewing a novel action/object scene. By observing how children extended the words to novel scenes they could determine if the novel words had been learned as nouns or verbs. While 5-year-olds appeared to be sensitive to morphosyntax for both noun and verb learning, 3-year-olds demonstrated only noun learning. Taken together, these cross-linguistic findings suggest that nouns and verbs are learned differently, and nouns have an advantage in the early preschool years.

Across languages, variations in syntactic structures may prompt differences in vocabulary development; and morphosyntactic cues may play different roles in cueing word learning. The competition model, proposed by MacWhinney and Bates (MacWhinney, 1997; MacWhinney and Bates, 1989) provides a framework for examining the cues that contribute to the development of lexical and grammatical skills that is applicable to Spanish-speaking children. MacWhinney and Bates suggest that the process of relating language to meaning is driven by the use of cues. Cues for understanding meaning come from sources such as sentence word order and morphology which marks gender and number agreement between words. In English, for instance, the typical order of words in a sentence is Subject-Verb-Object (SVO). Therefore, learners can rely on word order cues to help determine that *cat* is the subject of the sentence *The cat ate the mice*. In Spanish, the equivalent sentence, *El gato comió los ratónes,* provides subject-verb number agreement cues that indicate *gato* is the subject of the sentence. If *ratónes* were the subject, then a plural verb form would be required to achieve subject-verb agreement.

MacWhinney and colleagues (Bates et al., 1984; Bates, McNew, MacWhinney, Devescovi, & Smith, 1982; MacWhinney, Bates, & Kliegl, 1984) have demonstrated that cues can support each other or compete with each other because they differ in strength and usefulness both within and across languages. These differences are related, in part, to a cue's frequency in the input and its ability to provide contrasting information. In Spanish, definite articles and direct object clitic pronouns may serve as morphological cues for learning new words as definite articles appear with nouns and direct object clitic pronouns appear with verbs. However, the specific forms that each morpheme takes, its convergence or contrast with other cues, and its frequency in the language is likely to affect how useful it is for functional communication. A learning task in which new words preceded by definite articles or direct object clitics are presented a limited number of times can help to reveal the cue strength of these morphemes. A review of the uses and forms of definite articles and direct object clitics is necessary to understand how these morphemes might influence word learning in Spanish. Table 1 lists the singular forms of the definite articles and direct object clitics in Spanish (which are of interest in this study) with accompanying examples of their uses.

Table 1: Spanish Definite Articles and Direct Object Clitics.

	Definite Articles	Direct Object Clitics
Masculine	**el** papel	**lo** rompe
	(**the** paper)	([he/she] breaks **it**)
Feminine	**la** manzana	**la** rompe
	(**the** apple)	([he/she] breaks **it**)

Definite articles in Spanish agree in number and gender with the noun that they accompany. The masculine singular definite article, *el*, contrasts in form and meaning

with the feminine definite article *la* as well as with the masculine and feminine singular direct object clitics. Thus, it should be a strong cue as it provides contrasting information from other potential morphological cues. The form *la* is both the feminine singular definite article and the feminine singular direct object clitic. Thus, *la* can appear before both a noun and a verb providing an ambiguous cue for determining the meaning of a word it precedes. Finally, the masculine singular direct object clitic pronoun is *lo*, which appears before verbs. The morphemes *el* and *lo* should differentially cue the presence of a noun or verb, respectively. However, the presence of *la* does not provide contrasting information and may not reliably indicate the class of the word that it precedes.

The acquisition of definite articles and direct object clitics is drawn out in young learners and particularly difficult for children with language impairment (Bedore & Leonard, 2001; Bosch & Serra, 1997; Jacobson & Schwartz, 2002; Restrepo & Gutierrez-Clellen, 2001). The greater difficulty often observed in children's production of these morphemes indicates that additional research is warranted to examine the role they play in development. The current study examines how children use these morphemes in comprehension tasks. It may be the case that although young children do not accurately produce definite articles and direct object clitics in all conditions, they understand that others' use of the morphemes helps signal the referents of new words. Alternatively, if the morphemes do not provide contrasting information for functional communication then children would not make use of these morphemes as cues for word meaning.

Assessing Word Learning

Information about children's word learning can be obtained by observing accumulated vocabulary at a certain point in development or by observing the process of word learning. Accumulated word knowledge can be measured with checklists, language

samples or test procedures which elicit targeted words. For both English- (Dale, 1991) and Spanish-speaking children (Jackson-Maldonado, Thal, Marchman, Bates, & Gutierrez-Clellen, 1993) correlations have been found between the measures of accumulated vocabulary reported on standardized developmental checklists of the McArthur Communication Development Inventories (CDI) and the measures of vocabulary quantity and diversity sampled from spontaneous play interactions. Still, different methods of measuring accumulated word learning can produce disparate results. For example, Tardif, Gelman, and Xu (1999) compared the noun and verb vocabularies of both English and Mandarin-speaking toddlers from checklist and spontaneous play measures. They found that mothers in both language groups were more likely to remember and report the nouns that children used over the verbs that children used. Additionally, measures of vocabulary knowledge taken from language sampling were affected by variations in the sampling contexts (Tardif et al., 1999). Standardized vocabulary tests which assess accumulated word learning may also produce a biased picture of word learning because these tests rely heavily on the naming of objects in pictures. For example, the Expressive One Word Picture Vocabulary Test (EOWPVT) contains 170 pictured test items of which 97% elicit nouns and 3% elicit verbs (Brownell, 2000). While language samples, checklists and standardized tests are tools for looking at the classes of words that children learn, they may produce results biased toward object words, and they do not provide information about the process by which learning has taken place. Additionally, these static measures of accumulated language knowledge my not necessarily be related to the processes children use to acquire new words. For example, Hollich and colleagues (2000) found no evidence of a correlation between infants vocabulary abilities as measured on the MacArthur Communicative Development

Inventory (CDI) and their performance on novel word learning tasks in 12 different studies.

Alternative methods for assessing the word learning process include observing children's performance when learning new words in controlled experiments. The Quick Incidental Learning (QUIL) procedure was developed by Rice and colleagues to observe how children map words in non-ostensive situations (Oetting, Rice, & Swank, 1995; Rice, 1990). During the QUIL procedure there is no direct teaching of the new words, rather children are exposed to the words while watching a video. In addition, children hear a number of different new words with each new word repeated a number of times, over more than one session. In the QUIL task, children have an opportunity to build up a representation of a word over multiple exposures in multiple contexts, assuming that they are attending to a new word each time it is presented. However, in this paradigm it is difficult to control a learner's attention to all words under all presentation contexts, therefore an understanding of the specific processes which are involved in learning an individual word are more difficult to observe and measure.

Another method for controlled observation of word learning processes is fast mapping which involves the initial exposure and resulting interpretation of a word (Carey, 1978). In fast mapping procedures children are explicitly presented with situations in which they hear one word presented a limited number of times. Shortly after presentation, children are prompted to use the learned word or to demonstrate understanding of its meaning by picture pointing, act-out or looking tasks. Novel words or real words with very low frequency are typically selected as learning targets in fast mapping procedures. Fast mapping provides a context for observing which cues and strategies play a role in the initial stage of word learning, and fast mapping paradigms have been employed to observe how children use morphosyntactic cues to help them

learn word meanings (e.g., Bedore & Leonard, 2000; Colunga & Gasser, 2001; Golinkoff, Diznoff et al., 1992). A fast mapping procedure allows for control of the conditions of exposure to new words in order to be certain that the learner's impressions of the word's meaning are related to the experimental exposure conditions. With only a few exposures to a new word, more information is obtained about the strength of the cues presented with the word rather than about the specific new word the child is learning in the moment. The disparate results in vocabularies measured through word inventories and standardized tests along with the difficulty in controlling children's attention to specific words in incidental learning suggests that an experimentally controlled method such as fast mapping is most useful for observing how an object bias and morphosyntactic cues influence word learning.

The purpose of the current study was to address how 3-year-old Spanish-speaking children use object bias and morphosyntactic bootstrapping to learn novel words. First, evidence for an object bias in word learning was sought out. If objects are universally advantaged in word learning then the children in this study should assume that novel words that they hear are nouns. Alternatively, if children interpret novel words according to linguistic and cultural biases, then the Spanish-speaking children in this study may be more likely to assume that novel words name something other than objects, specifically actions. Second, evidence for children's use definite articles and direct object clitic pronouns as cues to interpret the meaning of novel words was also explored. If the rich morphological system in Spanish provides an advantage for morphosyntactic bootstrapping then children would be able to use them as cues for word learning. However, as the competition model proposes that all morphemes are not equally useful, it is possible that the definite articles and direct object clitics presented as cues in this study do not provide strong cues for novel word learning in a fast mapping paradigm. Finally, a

relationship between children's accumulated knowledge of definite articles and direct object clitic pronouns and their ability to use these morphemes as cues for interpreting novel words was explored. The development of production skills for definite articles and direct object clitics appears to be drawn out in typically developing children and especially problematic for children with language impairment, thus it is informative to know if children's production skills are related to their ability to use these same morphemes as cues in word learning.

METHOD

Participants

Thirty-seven predominantly Spanish-speaking children participated in this study. The children ranged in age from 36 to 47 months (mean age = 43.26 months). No parents reported concerns about receptive or expressive language or auditory status for any of the children in the study. According to parental report the children primarily communicated in Spanish (average daily output or use of Spanish = 92.76%, SD = 8.08%), though every child also heard some English (average daily input or exposure to English = 21.45%, SD = 12.29%). The Appendix contains the family interview form, based on Gutierrez-Clellen and Kreiter (2003), which was used to determine typical development, auditory status, and amount of language exposure and use. An additional 12 children were recruited to the study but did not qualify to participate because five children used English for more than 25% of their waking hours, six children did not complete participation after being recruited, and one child did not qualify due to parental concern regarding delayed communication skills.

Procedures and Tasks

Children participated in two sessions scheduled within two weeks of each other. In each session a warm-up task, two fast mappings trials, a previous knowledge probe and a morpheme elicitation task took place, always in that order.

A warm-up task familiarized children with the fast mapping task and ensured that children could provide responses which differentiated actions and objects. On the first day during the warm-up task, children viewed four to six scenes where a doll performed

familiar actions with familiar objects while the examiner named either the action or object in the scene. After exposure to the scenes children indicated the action or object named. They pointed to or picked up a named object in response to a prompt such as, "*Enséñame la pelota*" (Show me the ball), or they demonstrated a named action in response to a prompt such as, "*Enséñame lo rompe*" (Show me [she] breaks it). If the child did not differentially point to objects or demonstrate actions the examiner gave the child feedback no more than three times about how to clearly perform a response which indicated an object or an action. Feedback included verbal reminders to point to the object or to demonstrate the action and physical demonstrations of how to point to objects or perform the actions. In order to continue in the study children had to show differentiated responses to at least three of four presented action-object scenes. Two additional familiar objects and actions were available to use for practice, for feedback or to help the child become comfortable with the examiner, though these object were not used to asses children's performance on the warm-up task.

After completing the warm-up procedure, each child participated in two of the four fast mapping trials. The four experimental conditions differed in the type of grammatical morpheme presented with the novel word. The conditions were: 1) no-cue, 2) *el* (singular masculine definite article, *the*), 3) *la* (singular feminine definite article, *the*, or singular feminine direct object pronoun, *it*), and 4) *lo* (singular masculine direct object pronoun, *it*). Within each fast mapping trial two familiar object-action scenes and two novel object-action scenes were presented. The familiar scenes reminded the child that the examiner could name either the action or the object from each scene. The foil scene was included to test if the children mapped the novel word to the targeted novel scene. If only one novel scene were presented then children may have been guided by novelty fast mapping the novel word to the only novel referent. All of the actions

employed in the study were transitive to ensure that when the forms *lo* and *la* were used as cues they could reasonably be interpreted as direct object clitics. Table 2 contains descriptions of the familiar and novel objects and their actions.

Table 2: Familiar and Novel Objects and Actions.

Familiar Scenes		**Novel Scenes**	
Object	Action	Object	Action
La vaca[a] (Cow)	Acaricia (Pet)	Chinese yo-yo	Elongate
El pollo[a] (Chicken leg)	Come (Eat)	Koosh on a stick	Roll on the floor
El perro[a] (Dog)	Acaricia (Pet)	Fabric covered doorstop on a wooden base	Bend
La puerta[a] (Door)	Cierra (Close)	Fabric covered slinky in a donut-shape	Rotate to and from center
La luz (Flash light)	Prende[b] (Turn-on)	Jacob's ladder	Flip
La caja (Box)	Abre[b] (Open)	Wire lotus flower	Flatten
La taza (Cup)	Tira[b] (Tip-over)	Wooden party favor	Spin
El plato (Plate)	Lava[b] (Wash)	Beads on a string	Slide beads

[a]object named during fast mapping trial, [b]action named during fast mapping trial

For each fast mapping trial the examiner presented the four objects and their actions and allowed the child to explore the objects for one minute, though the examiner did not name the objects at this time. This exploration time served two purposes. It allowed each child to satisfy his curiosity about the novel objects so that he could wait for the examiner's prompt in the testing phase without grabbing them. Otherwise, children would have seen the objects but not have been allowed to touch them for approximately 5 minutes. In pilot testing many children picked-up or manipulated the novel toys before the examiner's prompt, thus is was not possible to tell if their responses were motivated by interest in certain objects and actions or by memory of the mappings they had made of

the novel word to its referent. The exploration time also created a pragmatically appropriate context for the examiner to make reference to the objects in the following presentation phase of the fast mapping tasks using the definite articles (instead of indefinite articles) as the objects were by then a part of the known and shared interactions.

Next, the examiner prompted the child to put all the objects into a house for the same doll used in the warm-up task. The doll emerged from the house with one object demonstrating its action while the examiner simultaneously provided the script which accompanied the action/object scene. Table 3 contains sample scripts for all of the four fast mapping trials. After each presentation the examiner put the doll back inside of the house with the object. This continued for the remaining scenes within a single condition; each presented one by one and then put away.

Directly after each scene was presented, the examiner placed the two familiar objects and the two novel objects as well as the doll which performed the actions in front of the child in random order for testing. In the testing phase of each fast mapping trial the examiner prompted the child to demonstrate her knowledge of the familiar action the familiar object and the novel word. For example, children were prompted to point to or give a chicken (a familiar object) with the phrase *Enséñame el pollo* (Show me the chicken). They were prompted to act-out tipping over a cup (a familiar action) with the phrase *Enséñame la abre* (Show me [she] opens it). Finally, the examiner prompted children to demonstrate their interpretation of a novel word, *nepe*, with the phrase *Enséñame nepe* (Show me the nepe). Table 4 contains sample scripts for testing in each of the four fast mapping conditions.

Table 3: Sample Scripts for Presentation and Testing in all Fast Mapping Experimental Conditions.

	no-cue condition	***el* condition**	***la* condition**	***lo* condition**
Target Novel	*Doll elongates a yo-yo* Mira [] *nepe*. ¿Ves? [] *Nepe.* (Look, [] *nepe.* See? [] *Nepe*.)	*Doll bends a door stop* Mira el *kobe*. ¿Ves? El *kobe*. (Look, the *kobe.* See? The *kobe.*)	*Doll flips a Jacob's ladder* Mira la *dupe*. ¿Ves? La *dupe.* (Look, she *dupes* it. See? She *dupes* it./Look, the *dupe.* See? The *dupe.*)	*Doll spins a party favor* Mira lo *tame*. ¿Ves? Lo *tame*. (Look, she *tames* it. See? She *tames* it.)
Foil Novel	*Doll rolls a koosh* Mira. ¿Ves? (Look. See?)	*Doll rotates a slinky* Mira. ¿Ves? (Look. See?)	*Doll flattens a wire lotus* Mira. ¿Ves? (Look. See?)	*Doll slides beads on a string* Mira. ¿Ves? (Look. See?)
Familiar Action	*Doll opens box* Mira la abre. ¿Ves? La abre. (Look, she opens it. See? She opens it.)	*Doll tips a cup* Mira, lo tira. ¿Ves? Lo tira. (Look, she tips it. See? She tips it.)	*Doll turns on a flashlight* Mira la prende. ¿Ves? La prende. (Look, she turns it on. See? She turns it on.)	*Doll washes a dish* Mira lo lava. ¿Ves? Lo lava. (Look, she washes it. See? She washes it.)
Familiar Object	*Doll eats chicken* Mira el pollo. ¿Ves? El pollo. (Look, the chicken. See? The chicken.)	*Doll shuts a door* Mira la puerta. ¿Ves? La puerta. (Look, the door. See? The door.)	*Doll pets a dog* Mira el perro. ¿Ves? El perro. (Look, the dog. See? The dog.)	*Doll pets a cow* Mira la vaca. ¿Ves? La vaca. (Look, the cow. See? The cow.)
Test Array	doll, yo-yo, box, koosh, chicken leg	doll, door stop, door, slinky, cup	doll, Jacob's ladder, dog, wire lotus, flashlight	doll, party favor, dish, cow, bead on a string
Test Prompts	Enséñame el pollo. (Show me the chicken.) Enséñame la abre. (Show me she opens it.) Enséñame *nepe.* (Show me *nepe*.)	Enséñame lo tira. (Show me she tips it.) Enséñame la puerta. (Show me the door.) Enséñame el *kobe*. (Show me the *kobe.*)	Enséñame la prende. (Show me she turns it on.) Enséñame el perro. (Show me the dog.) Enséñame la *dupe.* (Show me she *dupes* it./Show me the *dupe*.)	Enséñame lo lava. (Show me she washes it.) Enséñame la vaca. (Show me the cow.) Enséñame lo *tame*. (Show me she *tames* it.)

For ease of task administration eight presentation and testing sets were created. The order of presentation of the four scenes within a fast mapping task, as well as the assignment of the four novel words, the four experimental conditions, and the use of novel objects as targets or foils were all randomized. Randomization reduced order effects as well as any unexpected effects from the pairing of particular novel words or novel objects. Additionally, in two fast mapping trials the examiner prompted children to show the familiar action immediately before prompting the targeted novel response and for the other two trials the examiner prompted children to show the familiar object before showing the targeted novel response. This counterbalanced any possible effect of tendency to show object or action responses from the preceding familiar scenes.

The familiar object and action words contained two syllables (matching the syllable length of the novel words) and are all listed on the MacArthur Inventario del Desarrollo de Habilidades Comunicativas: Palabras y Enunciados (Communication Development Inventory: Words and Phrases) (Jackson-Maldonado et al., 2003) therefore they should be familiar to 3 year-old children. The novel words created for this study were, *tame, nepe, dupe,* and *kobe*. These words all conform to the predominant CVCV word shape in Spanish. In addition, they all end with the phoneme /e/ which is permissible for both singular nouns and third person singular present tense verbs. Spanish nouns which end in /e/ do not carry overt gender markings as do nouns ending in /o/ or /a/ which typically indicate masculine (e.g., *el perro, the dog*) and feminine (e.g., *la vaca, the cow*) nouns (Navarro, 1968). Thus, the articles *el* or *la* could both be used with these novel words. It should be noted that nouns ending in *–e* are less frequent than nouns ending in *–o* and *–a*. Spanish third person singular present tense verbs can end in /a/ (e.g., *habla, [he/she] talks*) or /e/ (e.g., *come, [he/she] eats*). Verbs in Spanish are classified by their endings in their infinitive forms, *–ar, –er* and *–ir*. When conjugated in third person

singular present tense, verbs in the *–er* and *–ir* verb classes end in /e/. Like nouns which end in /e/, verbs ending in /e/ are lower in frequency (because *-er* and *-ir* verbs are lower in frequency.)

After participating in the two fast mapping trials, children participated in a task which probed for previous knowledge of the actions and objects presented during fast mapping. It was assumed that if children had a name for a novel object or action presented, this previous knowledge could prevent them from mapping the novel name which the examiner provided (Merriman et al., 1995). The examiner randomly selected one of the eight novel and familiar objects used in the two fast mapping sessions for the day and drew the child's attention to it while asking, "*Qué es*?" (What is it?) and then, "*Qué hace*?" (What does it do?) to elicit verbal responses from the children. This was repeated until the child had had the opportunity to name all of the objects. Fast mapping trials for which a child provided an action or an object label related to the targeted novel scene were marked for removal from analysis.

Last, children completed a morpheme elicitation task to assess their use of either direct object clitics or definite articles. These tasks were modeled on elicitation task used by Bedore and Leonard (2001). In these tasks children viewed a book with the examiner which had two pictures per page. They listened to the examiner describe the first picture and then they described the second picture in a cloze task. For example, to elicit the definite article in the noun phrase *la casa* (the house), the examiner and child described a picture of a teacher going to a school and a picture of a boy going to a house. First the words *escuela* (school) and *casa* (house) were introduced using indefinite articles (e.g., *una escuela, una casa*) to establish the correct context for using definite articles in the subsequent reference to the school and house. After establishing the context the examiner referenced the pictures again saying, "*La maestra va a la escuela y el niño va a… la*

casa" (The teacher goes to the school and the boy goes to…the house). Direct object clitics were elicited in a similar manner. The order of presentation of the definite article and direct object clitic tasks were counterbalanced so that some children completed it on the second day.

Each child was seen for a second session in which they participated in tasks similar to the first session. Children met the warm-up criteria to participate in the study on the first day, therefore the warm-up task on the second day served as a reminder of how to respond to actions and objects. Children then completed the remaining two fast mapping trials, the previous knowledge task and the remaining morpheme elicitation task.

Experimental sessions were conducted in the child's home or school in an area free of distractions. Sessions used to calculate reliability were recorded using a SONY ICD-MS515 digital voice recorder or a Sony Hi-8 video recorder. The investigator conducted all of the experimental sessions. She is a fluent speaker of Spanish.

Scoring and Reliability

Children's responses to the fast mapping scenes were of three types. A *targeted-object* response was credited when a child selected the novel object upon prompting, and a *targeted-action* response was credited when a child responded by demonstrating the targeted action themselves or using the doll. These types of responses were indicative that children had successfully fast mapped the novel word to the targeted action-object scene. Children's *other* responses were actions or objects that were not related to the targeted scene. Children provided other responses such as 1) performing the action related to the foil novel scene, 2) pointing to the novel foil object, 3) performing the familiar action, 4)

pointing to the familiar object, 5) performing a non-demonstrated action with any of the experimental objects, or 6) refusing to respond.

All of the children's responses were scored and coded on line by the experimenter. Thirty of the 37 children participated in videotaped experimental sessions. To evaluate reliability of the fast mapping coding procedure an independent judge (a bilingual graduate student in speech-language pathology) watched a videotape and recoded 20% of the fast mapping trials from the full data set. Inter-judge coding reliability was 93.1%.

Children who attempted at least 10 responses on each morpheme elicitation task received a percentage of accuracy score. Accurate responses matched in both number and gender to the picture target. The experimenter wrote all of the children's responses on-line and later scored them for accuracy. Digital audio recordings of the sessions were available for 23 of the 37 children who participated in the study. To evaluate reliability of the morpheme probes, the same independent judge previously mentioned used the audio recordings and rescored the probes for 20% of the total children in the study. Inter-judge reliability on the article and clitic probes was 89.4%.

Hypotheses

This study explored the possibility that children use an object bias in their interpretation of novel words. Depending on children's word learning strategies and use of morphosyntactic cues, three different outcomes for the children's interpretations of words were anticipated. If the children used an object bias to help them interpret novel words then the children's responses would primarily be object responses. If the children did not use a bias in interpretation, then action and object responses would be at chance levels. If children were motivated – through linguistic or cultural influences - to demonstrate their knowledge of actions, then more action responses would be observed.

Also of interest in this study is how grammatical cues help children learn novel words as objects or actions. In one experimental condition in this study children heard a novel word presented without grammatical cues, and in the three remaining experimental conditions children heard a novel word preceded by one of the following morphemes; *el*, *la* or *lo*. Recall that *el* is a definite article which appears with nouns, and *lo* is a direct object clitic that appears with verbs; however *la* can be either an article or an object clitic and thus it can precede both nouns and verbs. If children attended to the morphemes then they should interpret novel words preceded by *el* as nouns, those preceded by *lo* as verbs, and novel words preceded by the ambiguous cue, *la*, would be interpreted similarly to words in the no-cue condition.

The relationship between children's ability to produce the morphemes of interest in this study and their ability to use these morphemes as cues for word learning was also of interest. If morphological production and comprehension skills are related, children who more accurately produced definite articles and direct object clitics in the elicitation task should demonstrate greater sensitivity to the morphological cues in a fast mapping task. Alternatively, if accumulated word knowledge is not related to the processes children use to acquire new words, then their level of production of definite articles and direct object clitics will not correlate with their performance on novel word learning tasks.

RESULTS

Analyses

Children participated in warm-up tasks, fast mapping tasks, previous knowledge probes and morpheme production tasks. Within the fast mapping task children provided responses indicating objects and actions from both familiar and novel scenes. To ensure that children could provide different responses under varying conditions an analysis of responses to familiar action and object was conducted. During the testing phase of the fast mapping trials each child saw 4 familiar actions and objects. Only 5.8% of responses to familiar scenes were inaccurate, or unrelated to the referenced scene, and these were removed from analysis as they did not provide information about how children responded to familiar words. A single factor repeated measures ANOVA comparing the percentage of trials in which object responses were observed in two conditions, when familiar actions or familiar objects were elicited, revealed a significant difference in responses by condition, $F(1,36) = 36.364$, $p < .0001$, $?_p^2 = .503$. Children pointed to objects significantly more often in response to requests to show familiar objects than familiar actions, demonstrating that children responded differentially to objects and actions within this response paradigm.

Children's responses to fast mapping scenes in which previous knowledge of the targeted scenes was demonstrated -whether or not the knowledge was correct- were eliminated from analyses, because these the trials could not provide information about how children mapped novel words to novel objects and actions. Information from the previous knowledge probes indicated that children already had a label for the targeted novel action or object in 24 of the total experimental fast mapping trials. The frequency

of children's responses to all fast mapping trials as well as the conservative data set in which the 24 trials where previous knowledge was indicated were eliminated is displayed in Table 4. (One fast mapping trial in the no-cue condition and one trial in the la condition were removed from the analyses due to examiner error.) All analyses were run on both data sets and yielded similar patterns of results. The results discussed below are from analyses using the conservative data set.

Table 4: Frequency of Responses in Fast Mapping Trials.

	Full Data Set				Conservative Data Set			
	Targeted Action	Targeted Object	Other	Total	Targeted Action	Targeted Object	Other	Total
no-cue	12	4	20	36	9	4	17	30
el	19	6	12	37	18	6	10	34
la	18	4	14	36	17	2	11	30
lo	14	6	17	37	12	3	13	28
Totals	63	20	63	146	56	15	51	122

Object Bias

To detect the use of object bias in novel word learning, the percentage of all the experimental trials for an individual child that resulted in targeted action responses and those that resulted in targeted object responses were calculated. The mean percentage of targeted action responses was 46.4%, and the mean percentage of targeted object responses was 12.4%. A single factor repeated measures ANOVA indicated that targeted action responses occurred significantly more often than targeted object responses, F (1, 36) = 17.709, $p < .001$, $?_p^2 = .33$.

The mean percentage of experimental trials that resulted in other responses unrelated to the targeted scene was 43.97%. The high rate of other responses merited further investigation to explore the possibility that action and object responses also occurred with different frequencies within the *other* response category. Recall that other responses were credited when children: 1) performed the novel foil action, 2) pointed to the novel foil object, 3) performed a familiar action, 4) pointed to a familiar object, 5) performed a non-demonstrated action with any of the experimental objects, or 6) refused to respond. The 51 other responses which represented erroneous responses to fast mapping trials appeared to be systematic. Children primarily indicated the action or object from the foil novel scene (37 times). They performed an action 34 times, pointed to an object 14 times, and they refused to respond 3 times. This distribution of action and object responses related to foil novel scenes and familiar scenes is similar to responses related to the targeted novel scenes. Table 5 demonstrates the frequencies of other responses in each response category.

Table 5: Other Responses in Fast Mapping Trials.

	Foil Scene	Familiar Scene	Non-Demonstrated action	No Response
action	26	4	4	3
object	11	3		

The data indicated that children did not employ an object bias in the interpretation of novel words. Instead, children provided action responses significantly more often than object responses when they successfully mapped the novel word to the targeted scene. An observation of the frequencies of action and object related responses to unsuccessfully fast mapped trials also indicated that action responses occurred more frequently than object responses.

Grammatical Cues in Fast Mapping

The second question considered in this study was whether children used the morphological cues presented to determine the class (i.e., noun or verb) of the novel words. Children's responses related to the targeted novel scenes were compared across the four experimental conditions to detect differences in responses which indicated object or action mappings.

The responses to experimental the conditions in this study were either targeted-action or targeted-object responses. As each child provided one response under each of the experimental conditions the data available to compare responses across experimental conditions consisted of binomial categorical responses with each child contributing a single categorical response. The GENMOD procedure provides a comparison of the probabilities of obtaining a specific categorical response under each of the experimental conditions (Glickman, n.d.). To analyze this non-linear categorical data a logistic regression must be performed. The GENMOD procedure within the statistical analysis package SAS employs general estimating equations to fit logistic regression models (Glickman, n.d.; Stokes, Davis, & Koch, 2000). The use of a general estimating equation to perform the logistic regression is most appropriate for the data in this study because it can be used to model categorical data obtained through repeated measures while adjusting estimates to account for missing data (Lipsitz, Kim, & Zhao, 1994).

A logistic regression which provided z-test values for the relative probabilities of observing a target-object response in each pair-wise comparison of the experimental conditions contained 71 fast mapping trials contributed by 34 children. Table 6 shows the values for the z tests for each comparison and the probabilities of obtaining each value.

None of the possible comparisons reached a significant level, indicating that the probabilities that children would provide an object response did not differ between the experimental conditions.

Table 6: Comparison of the Probabilities of Obtaining a Targeted Object Response from Fast Mapping Trials Which Yielded Targeted Responses.

Comparison	z	*p*
no-cue to el	0.20	0.8434
no-cue to la	-0.40	0.6905
no-cue to lo	-0.03	0.9772
el to la	-0.79	0.4319
el to lo	-0.32	0.750
la to lo	0.48	0.6282

The high number of responses which were unrelated to either the targeted object or action merited further investigation. It was possible that the experimental cue conditions had differing effects on the likelihood that children mapped the novel word to the targeted scene, though not necessarily to the action or object of that scene.

An additional test of the probabilities of obtaining a response related to the targeted scene (both action and object) determined if the four experimental conditions influenced whether the children mapped novel word to the targeted scene. This model contained 122 fast mapping sessions from 37 children. The results for all pair-wise comparisons are listed in Table 7. The comparison for *no to el* was significant as the analysis yielded a z-test value which would be obtained by chance in fewer than 3% of occasions. The odds ratio for this comparison indicated that a response related to the target scene was 3.12 times more likely to appear in the *el* experimental condition than in the no-cue experimental condition. Therefore, when children heard a novel word preceded by the morpheme *el* they were more likely than if no cue had been presented to map the novel word to the targeted scene. All remaining comparisons did not reach

significant levels indicating that targeted-scene responses did not differ in the remaining experimental conditions.

Table 7: Comparison of the Probabilities of Obtaining a Targeted Response from all Fast Mapping Trials.

Comparison	z	*p*
no-cue to el*	2.14	0.0324
no-cue to la	1.43	0.1518
no-cue to lo	0.89	0.3756
el to la	-0.52	0.6013
el to lo	-1.16	0.2478
la to lo	-0.82	0.4120

*indicates significant difference

Grammatical Morpheme Production and Comprehension

A final set of analyses explored the last research question which asked if there is a relationship between children's ability to produce grammatical morphemes and their ability to use them as cues for learning novel words. Table 8 lists the percentages of accurate morpheme productions for definite articles and object clitics on the production probes. Children were more accurate in producing definite articles than direct object clitics, and comparisons between definite article and object clitic accuracy percentages for individual children revealed the same relationship. Of the 36 children for which a comparison was possible, 26 produced definite articles with greater accuracy than direct object clitics.

Table 8: Children's Productions of Definite Articles and Direct Object Clitics.

Definite Articles (N=37)	Direct Object Clitics (N=36)
Mean Accuracy = 29.7%	Mean Accuracy = 16.3%
Standard Deviation = 21.8	Standard Deviation = 19.7

As a group, the children in the current study produced definite article errors on the elicited production task which were primarily errors of omission followed by errors in number and then gender. Children occasionally made errors of definiteness such as substituting *unas* (indefinite feminine singular determiner) for *las* (definite feminine singular determiner). Errors demonstrating combined gender and number substitutions were present but least frequent, and the most frequent definite article produced, whether accurately or not, was the feminine singular, *la*. Children's direct object clitic errors on the elicited production task were primarily errors of number, followed closely by gender and then omission errors. Errors demonstrating combined gender and number substitutions occurred with the least frequency. The direct object clitics *lo* and *la* were produced with similar frequencies, and both were more frequently produced than plural forms.

As previously demonstrated, the children's ability to map novel words to their target scenes varied by experimental cue condition. To determine if this ability to use grammatical morphemes as cues to map words to their target is influenced by children's proficiency in producing the same grammatical morphemes Pearson correlation coefficients were obtained for the relationship between three measures; the percentage of accuracy in producing definite articles, the percentage of accuracy in producing object clitics, and the percentage of successful mappings to target scenes in the four fast mapping trials. The percentage of accuracy on the definite article and the direct object clitic production measure correlated highly with each other, $r = 0.63693$, $p < .0001$, $r^2 = .406$. However, the percentage of accuracy on the definite article probe did not correlate with children's accuracy in fast mapping to the target scene, $r = 0.01060$, $p = 0.9511$, $r^2 = .0001$ and the percentage of accuracy on the direct object clitic probe did not correlate

with children's accuracy in fast mapping to the target scene, r = -0.02899, p = 0.8648, r^2 = .0008.

These results provide important evidence related to preschool Spanish-speaking children's use of object bias and grammatical morphemes as cues for novel word learning. First, if children used an object bias to interpret novel words then the observed frequency of object responses would be greater than those obtained by chance. However, in all analyses, children demonstrated a preference for providing action responses over object responses. These results suggest that children are not employing object bias to interpret the referents of new words under the conditions in this study.

The results for analyses related to the use of grammatical cues in word learning revealed three important findings. Children do not appear to be using grammatical morphemes to help them interpret the word class of novel words. However, at 3 years of age there appears to be an emerging use of the morpheme, *el*, to assist children in remembering the targeted referent scene for a novel word. Additionally, the results from this study suggest that at the age of 3 years, children's ability to produce grammatical morphemes is not necessarily related to how they use them as cues in a fast mapping task.

DISCUSSION

This study investigated the extent to which Spanish-speaking preschoolers used an object bias and morphosyntactic bootstrapping to learn new words. Object bias was explored by comparing the frequencies of action and object responses children provided. Morphosyntactic bootstrapping was explored by comparing the probabilities of observing specific responses under each of the experimental conditions. Finally, the relationship between accumulated vocabulary knowledge and the use of morphosyntactic cues to acquire new vocabulary was explored by comparing children's success in producing the morphemes of interest in this study to the frequency with which they mapped novel words to the targeted novel scenes.

Object Bias in Word Learning

While there is evidence that nouns are privileged in early vocabulary development in English, their status relative to other word classes such as verbs appears to differ across language and cultural groups (i.e., Tardif et al., 1997). The results of the current study indicated that Spanish-speaking preschoolers demonstrated a preference for demonstrating action knowledge over object knowledge. Children produced significantly more action responses than object responses when asked to demonstrate their interpretation of a novel word which had been presented simultaneously with a novel action/object scene. In similar fast mapping tasks which included act-out responses English-speaking children were either likely to indicate objects more than actions or their responses were at chance levels, depending on the presentation conditions (Eyer et al., 2002). Spanish-speaking children's preference for demonstrating action responses in this

study is consistent with predictions based on linguistic and cultural information indicating an emphasis on knowledge of actions and functions.

Paradigms which test object and action word learning may not be equally sensitive to how this learning takes place across cultural and linguistic communities. Peña and Quinn (1997) found evidence that testing tasks which elicit knowledge about object functions and actions aligns better with socialization practices that Hispanic preschoolers experience than tasks which elicit object names. Observations of mother-child interactions also indicate this pattern. While English-speaking adults produce nouns more frequently and in more salient sentence positions than verbs during toy play with their children (Goldfield, 1993), adults speaking null subject languages such as Mandarin (Tardif et al., 1997), Korean (Choi & Gopnik, 1995), Italian (Camaioni & Longobardi, 2001), and Spanish (Peña et al., in preparation) produce verbs more often or in more salient positions than nouns. Additionally, though English-speaking mothers often provide object labels while interacting with their children (Goldfield, 2000), mothers of Mexican descent playing with their preschool-aged children provide object labels as well as information about objects in reference to actions (Pérez-Granados, 2002). While Spanish-speaking children certainly learn both actions and objects, they may reveal this learning differently than other children depending on how the knowledge is elicited.

Grammatical Cues for Word Learning

The use of morphemes as cues for learning was hypothesized to be well developed in Spanish due to its rich morphological system where most words are morphologically marked. Thus, the children in this study would take advantage of the definite articles and direct object clitic morpheme cues presented to learn new words. An analysis which examined how children use the morphemes to interpret the novel words as

objects or actions revealed no significant differences in the children's interpretations under each of the experimental conditions. A second analysis of children's rates of success in mapping the novel word to the targeted scene did reveal differences between cue conditions, indicating that children used morphological information to map words to their referent scenes. Specifically, children were more likely to map a word to its targeted referent scene when it was presented with the morpheme *el* than when no morpheme was presented. As MacWhinney and colleagues (1984, 1989) proposed in the competition model, the frequency of occurrence of *el* and its ability to provide a clear contrast from other morphemes likely made it the strongest of the cues tested. An examination of child directed Spanish-speaking adults playing with 36-month-old children revealed that in 464 utterances the definite article *el* appeared 36 times, while the definite article *la* appeared 34 times, and the direct object clitic *lo* appeared 26 times. (Jackson-Maldonado & Thal, 1993). Thus, *el* was the most frequent cue. Though the definite article *la* was also frequent, its strength as a cue was diminished by the competing presence of 8 occurrences of the direct object clitic *la*. Thus, while both *el* and *la* appear with high frequencies, only *el* is in a strong position to provide clear and contrasting support as a cue.

The difference in accurate scene mapping between the no-cue condition and the *el* cue condition can also be explained by additional factors. First, children demonstrate a preference for grammatical utterances (Gerken & McIntosh, 1993; Santlemann & Jusczyk, 1998), therefore they would be more likely to map the novel words to the accurate scene under the three conditions in which a grammatical cue was presented over the no-cue condition where no grammatical cue was presented. Second, infants learning Spanish are sensitive to grammatical gender agreement between definite articles and their corresponding nouns (Williams & Fernald, 2006), and the development of object clitic production appears to lag behind the development of definite articles (e.g., the production

scores from the children in this study.). Thus, definite articles are likely to be stronger cues for word learning than are object clitics. Finally, the definite article *el* appears more frequently in Spanish than *la* (Jackson-Maldonado & Thal, 1993; Navarro, 1968; 1991; Smith, Nix, Davey, López Ornat, & Messer, 2003). Also, Pérez-Pereira (2000) found that children 4 to 11-years-old produce more masculine definite articles than feminine definite articles with novel nouns. The finding that *el* was the most useful cue for children in this study is consistent with data on Spanish language use and input to children.

Though Spanish has a relatively rich morphological system, and the morphemes carry important information, children in this study appeared to use the morpheme cues for segmentation though not for word meaning. That is, they experienced success in mapping a novel word to its appropriate novel scene more often under strong cue conditions, but they did not use the morphemes to differentiate the action or object of the referent scene. It is likely that children need experience with the morphemes beyond preschool to take full advantage of the information that definite articles and direct object clitics provide in order to bootstrap the meaning of novel words as actions or objects.

Even if the children had been able to dedicate their full attention to the morphological cues presented in this study, it is possible that the rich morphological system in Spanish does not provide a benefit for the use of all morphemes as syntactic bootstraps. Instead, each language specific morpheme may interact differently with other information in the process of learning. The definite article and direct object pronoun morphemes used as cues in this study may not have been salient cues for determining the class of novel words because they are unstressed and they often appear in non-salient sentence and phrase medial positions making them harder to perceive and produce (Peters, 1985).

Additionally, the forms of the definite objects and direct object clitics have properties in common with other grammatical morphemes making them more difficult to distinguish from each other. Solé and Solé (1977) list the various forms in which *el*, *la* and *lo* are used in Spanish. The morpheme *el* is a definite article before a noun in the phrase e*l niño comió* (the boy ate), and it is a subject pronoun in the phrase *él comió* (he ate). Also, *la* is a definite article as in *la casa* (the house) as well as a direct object clitic as in *la come* ([he/she] eats it), and a determiner as in the phrase *la chiquita* (the little [one]). Finally, *lo* can be a direct object clitic in *lo rompe* ([he/she] breaks it) and it can appear with adjectives or adverbs as an article or determiner to describe some aspect of a noun, situation or action as in *lo maravilloso* (that [which is] marvelous).

The varied nature of each of these morphemes may have diminished their utility as syntactic bootstraps in this current fast mapping task. However, with increased language experience Spanish-speaking children do learn to produce the morphemes in an adult like manner. When these morphemes are combined with other cues or presented multiple times, children may be able to use the morphemes as bootstraps for learning the full meaning of new words.

It is likely that the utility of the definite article and direct object clitic cues used in this study were also influenced by the demands of the task used in this study. An indication that task demands were too high is that children provided responses in which they performed the targeted action or pointed to the targeted object in only 58% of all analyzed fast mapping trials. Thus, children had difficulty maintaining a mapping of the novel word to the targeted referent scene. This rate of mapping novel words to targeted scenes is comparable to the rate observed by Bedore and Leonard (2000) who tested Spanish-speaking 3-year-olds' ability to fast map verbs which differed in inflection from teaching condition to testing condition. They found that only 50% of trials resulted in

responses indicating the targeted action or object, and proposed that the variation in inflection increased the demand of the task. Word learning trials in which task demands are high may prompt children to spend cognitive resources on maintaining the mapping of the novel word to its referent scene, thus they do not take full advantage of the morphological cues presented to interpret the class of the novel words.

While many studies of fast mapping have observed how children learn words within a single form class (i.e., noun *or* verb), this study observed how children determine the referents of words across form classes (i.e., noun *and* verb). The possibility that the novel word was either a noun or a verb may have increased the demand of the task as it is likely that words for actions and objects are learned through different strategies. For example, Golinkoff et al. (1995) postulated that when children first observe an event in which an object and an action are both novel, they will use the principle of object scope (the assumption that words map to whole objects) to interpret the novel word to refer to the object. Later in development, when children become sensitive to syntactic cues, they apply additional hypothesis to word learning beyond object scope which may be more useful for learning words such as verbs. Also, Merriman and colleagues (1995) observed differences in the way that preschoolers employ strategies to learn new nouns and verbs. They found that children used the principle of mutual exclusivity less often in action naming tasks than in object naming tasks, demonstrating that the processes children used to map names to objects and actions are different. Others have also observed differences in the utility of morphosyntactic cues for learning the names of objects and actions (Imai et al., 2005, Eyer et al., 2002).

Another, factor that may have increased task demand is the number of exposures to the novel word. Children in the present study experienced two presentations in which the novel word and its cue were paired with the novel referent scene. These two

presentations may have been insufficient exposure for children to map the word to the targeted scene. Bedore and Leonard (2000) found that after two exposures to a novel verb, English and Spanish-speaking 3-year-olds were likely to provide responses target scene related responses in 50-73% of trials. Tomasello and Akhtar (1995) provided 10 exposures to English-speaking 2-year-old children learning novel nouns and verbs and observed targeted responses in 84% of the total responses. Thus, it is likely that with greater exposure children in the current study could concentrate less on mapping a word to its targeted scene and then dedicate more resources to processing additional information (i.e., morphological cues) which providing information about the specific referent of the novel word within the targeted scene. Future research could explore the possibility that more than two exposures to novel words with morphological cues may help children to form a stronger mapping to the targeted novel scene, thereby reducing the memory load associated with the task and increasing the possibility that children take advantage of the morphological cue to indicate the form class of the word.

An additional factor which may have influenced how children used the cues in this study is the context in which they were presented. The morphological cues may not have been useful for bootstrapping, because they were the only cue to form class, such cues are typically present in convergence with other cues. The current study was controlled so that the only cue available to the children was either a definite article or a direct object clitic, while additional syntactic and phonological information was deliberately removed. However, research with English-speaking children has indicated that bootstrapping is successful when morphological and syntactic cues converge (Eyer et al., 2002; Golinkoff, Diznoff et al., 1992). The children in the current study may have been more successful at using the available definite article and direct object clitic cues if

they had been presented in convergence with other cues. The following phrases, for example, support a noun interpretation with increasingly greater cue convergence.

a) *el nepe* (the nepe)

b) *el nepo* (the nepo)

c) *el nepo come la manzana* (the nepo eats the apple)

Phrase a) demonstrates a morphological cue alone (i.e., definite article *el*) to indicate that the novel word, *nepe*, is a noun. Phrase b) provides both morphological and morpho-phonological cues as the novel word ends with the phoneme /o/ which is the most typical final phoneme for masculine singular nouns. Phrase c) provides morphological, morpho-phonological, and syntactic cues as the noun phrase, *el nepo*, occupies the initial position of a canonical subject-verb-object sentence.

Grammatical Morpheme Production and Novel Word Learning

The last research question addressed whether children's ability to produce grammatical morphemes is related to their ability to employ the same grammatical morphemes as cues for word learning. Children demonstrated a greater ability to map a novel word to its referent scene when the novel word was presented with the cue *el* than when the novel word was presented without any grammatical morpheme cue. Thus, the relationship between children's ability to produce definite articles and direct object clitics was compared to their ability to accurately map a novel word to the targeted scene. The results of this study suggest that children's proficiency in producing grammatical morphemes is not correlated with their ability to use them as cues in word learning. These findings may be explained in two ways.

First, the findings are in keeping with other word learning studies which have explored the relationship between accumulated vocabulary or grammatical knowledge

and strategy use in the process of acquiring new words. Hollich et al. (2000) found that infants' accumulated vocabulary scores did not correlate with their performance on novel word learning tasks. One proposed cause of this non-relationship is that static or accumulated vocabularies do not assess the process by which acquisition takes place. When the children in this study demonstrated their use of learned grammatical morphemes in an elicitation task, they were producing grammatical morphemes with Spanish nouns and verbs already a part of their repertoire. This measure may not necessarily correlate with the processes they used in the initial learning of new nouns and verbs. The ability to produce unanalyzed units of speech containing well formed morphosyntactic components has been noted by Tomasello (2003) who suggested that the initial learning of words and their morphemes for young children involves rote-learning of unanalyzed units. At 3 years of age children just begin to understand that the morphosyntactic structures they are producing can be separated and recombined according to linguistic rules. But, the full process of becoming adult-like in the comprehension and production of morphosyntax appears to stretch at least into the early school-age years (e.g., Kail, 1989; Kail & Charvillat, 1988).

An alternative possibility is that children's level of performance on the tasks was not high enough to detect a relationship between the two. The children in the current study produced definite articles and direct object clitics in elicitation tasks with less than 30% accuracy, and they provided fast mapping responses related to the targeted referent scene in fewer than 60% of trials. It is possible that there was simply not enough variability in the two measures for a relationship to be detected. If older children, who are more productive with definite articles and direct object clitics, were to participate in the same fast mapping task, then a relationship between morphological production and cue use might become apparent.

Future Directions

Findings in the current study identified a number of issues which could be resolved with information from future research. First, as was anticipated, the children in this study provided responses consistent with proposed linguistic and cultural emphasis on action and behavior. Future fast mapping studies which employ other response paradigms such as eye gaze or picture pointing will provide more information about how children interpret words as objects or actions. With information from a greater number of testing and response paradigms, it can be determined which paradigms most reasonably capture the true nature of how children learn new words.

Findings also revealed that while children are beginning to use morphemes as cues for segmenting new words, they do not appear to use them to differentiate word class. Future research with older children may reveal that with increasing language experience children become sensitive to all the contexts in which *el*, *la* and *lo* appear, and this increased sensitivity may make the cues more useful as bootstraps for word meaning. In addition, research with older children who demonstrate greater success in producing the morphemes of interest in this study may reveal an emerging relationship between children's production skills and their ability to use these morphemes as cues for word learning.

Task demands may also have contributed to the utility of the tested morphemes as cues for word learning. Three possible sources of increased demand were identified for the current study; children's responses could indicate either actions or objects, they were exposed to novel words a relatively few number of times before testing, and they cues were presented in isolation. The potential burden of learning both action and object words in a single task could be alleviated in future research by employing methodology with a

between subjects design in which individual children learn to provide either an action or an object response for a novel word. Then, if the demands of the current response paradigm are in fact too great, children will have more success providing targeted responses. Future research could also test whether a greater number of exposures to the novel words increases children's success with the task. And finally, future research should explore how these morphemes function as cues for word learning when they are presented in convergence with other cues.

APPENDIX

Parent Questionnaire

Child ID #:	Date of Interview:
Family Address:	Family phone number:
Person conducting interview:	Relationship of Informant to Child:

- ¿A su niño/a le han hecho una evaluación de comunicación? Si le hicieron una evaluación, los resultados indican problemas de comunicación? (Has your child had a communication evaluation? If so, do the results indicate problems with communication?)

En comparación con otros niños de la misma edad de su hijo/a: (Compared to other children your child's same age:)

- ¿Tiene problemas otra gente para entender las palabras que dice su niño por dificultad de pronunciar los sonidos cuando está hablando? (Do others have problems understanding the words your child says due to how he produces his sounds when he speaks?)
- ¿Está preocupado/a sobre la manera en que su hijo/a forma oraciones para comunicarse? (Are you concerned about the way that your child forms sentences to communicate?)
- ¿Tiene su niño problemas de entender lo que otras personas están diciendo? (Does your child have difficulty understanding what others are saying?)
- Ha padecido de infecciones del oído? (Has your child had ear infections?)
  Ocurren muy a menudo? (How often?)
  Cuando fue la última? (When was the last one?)

- ¿Qué hace su niño/a en un día típico, y qué idiomas escucha? (What does your child do in a typical day and what languages does he/she hear?)
- ¿Qué idiomas usa su niño/a mientras habla con varias personas durante el día? (What languages does your child use while talking with different people during the day?)

Time	Activity (jugar, ver tele, comer, dormir)	Participants (mamá, hermano, tele)	Language(s) used by Participant: Eng. | Span.		Hours of Language Input: Eng. | Span.		Language(s) used by child: Eng. | Span.		Hours of Language Use: Eng. | Span.	
7am										
8am										
9am										
10am										
11am										
12pm										
1pm										
2pm										
3pm										
4pm										
5pm										
6pm										
7pm										
8pm										
9pm										
10pm										
Total Hrs awake:		Total Hrs. of exposure/use in each language ?								

Percentage of Spanish Language Exposure = Hrs exposed to Spn/ Total waking Hrs = _____%

Percentage of English Language Exposure = Hrs exposed to Eng/ Total waking Hrs = _____%

Percentage of Spanish Language Use = Hrs Spn is used /Total waking Hrs = _____%

Percentage of English Language Use = Hrs Eng is used / Total waking Hrs = _____%

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